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OFFICIAL PUBLICATION OF THE AMERICAN ASSOCIATION OF CEREAL CHEMISTS

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- YEAST PRODUCTION
- BREAD — SIGNIFICANCE
- THE PROGRAM CHAIRMAN
- AACC PARTICLE SIZE REPORT

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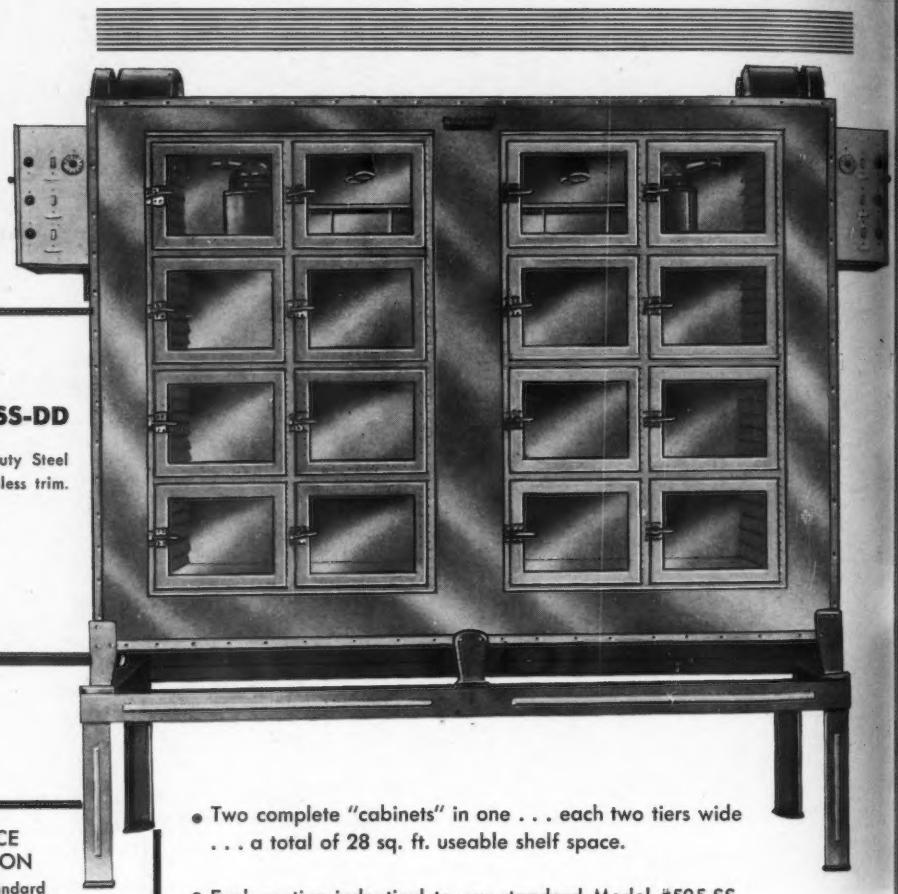

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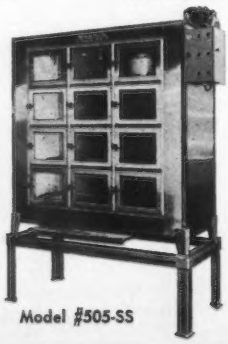

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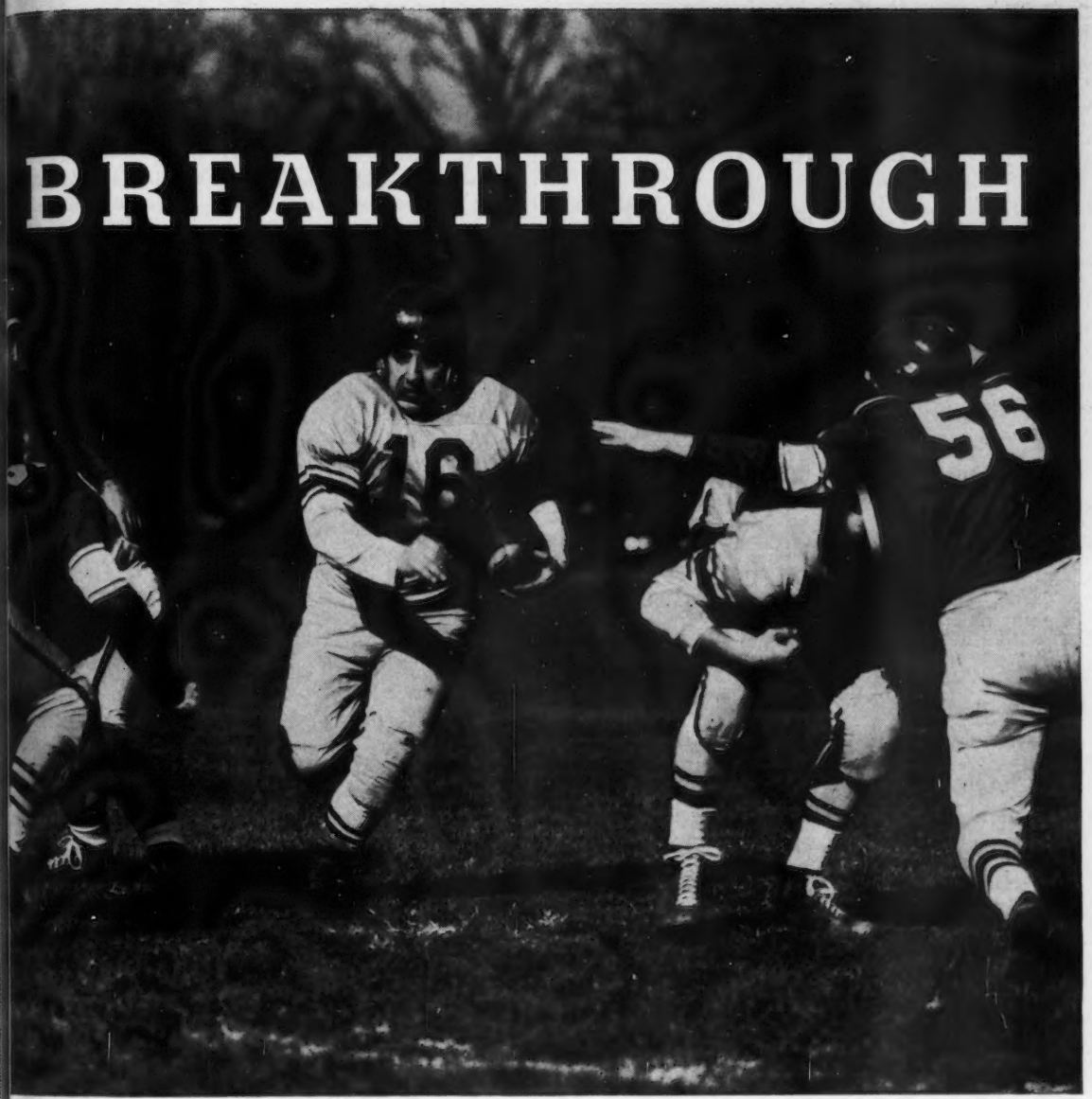

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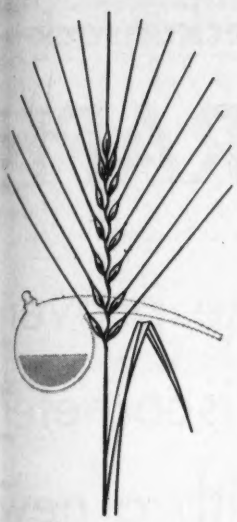
Membership in the AACC is open to professionally qualified individuals anywhere in the world. Corporate memberships are available for those companies wishing to lend industry support to the scientific work of the Association. An application form for membership may be obtained by writing the American Association of Cereal Chemists, 1955 University Avenue, St. Paul 4, Minnesota.



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COVER: Interesting photographic effect is achieved by partially framing Monsanto Chemical Company's new Research Center beneath a bridge structure. The bridge and a tunnel system, 1,100 feet in length, link the Center's building complex with the general offices in Creve Coeur, Mo.

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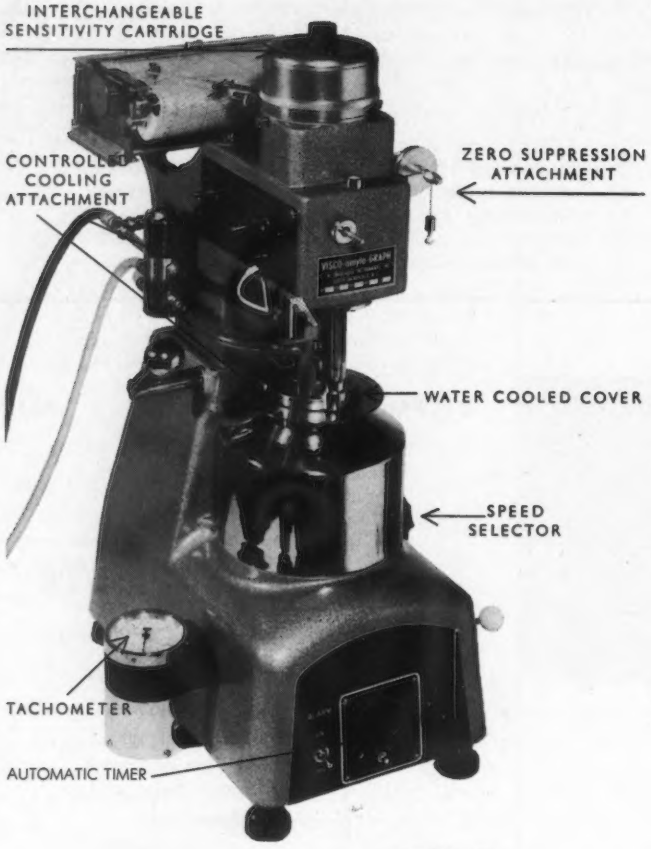

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editorial

Effective communication must be largely dependent upon the human elements involved. Someone must speak or write and someone else must listen or read. These activities do not take place to the same degree among all people. There are those who are more loquacious than their thoughts or information seem to justify. They are counterbalanced by others who are reluctant to do their share of writing and speaking. Many cereal chemists would have to be classified in the latter group.

Recent adoption by the U.S.D.A. of the sedimentation test as a basis for setting loan values on wheat has prompted a flood of comment pro and con. These discussions have been largely characterized by a paucity of enlightening information and much repetition of the opinions of those whose knowledge must of necessity be second-hand.

Cereal chemists are interested in the professional activities, promotions, and moves of their friends, but they seldom send such new items to the AACC office for publication in CST.

Every AACC member, with whom we have conversed on the subject, will admit to having some ideas on how the Association could better serve its members, but a minor share of these suggestions are forwarded to the officers for their consideration.

A "Letters to the Editor" department in this publication offers its readers a chance to "get things off their chest." For most issues we have no letters to publish.

We like to solicit feature articles for CST on subjects that readers indicate would be of interest and value to them. When readers are uncommunicative, we must consult our crystal ball.

Will these remarks provoke a flood of letters from our silent fellow cereal chemists? We hope so!

P.E.R.

commercial
bread-baking as
related to around-the-world

Yeast Production and Practices

By Oswald Freund

Red Star Yeast & Products Co.
Milwaukee, Wisconsin

MAN MASTERED THE art of bread-baking thousands of years ago. Documentary evidence of this in the history of mankind is plentiful. Most prominent and dramatic is the reference in Exodus, where we are told that the Jews had to leave Egypt in such haste that they had no time to leaven their doughs to be taken along on the journey. This event is commemorated in the Jewish religion by eating the unleavened *mazos* for eight days during the Passover.

Bread-Baking Becomes a Craft

Baking of bread became a craft, probably when man started to specialize. He had learned that proper proficiency in the multitude of human endeavors could be achieved only if concentrated more or less in one direction.

The baker at first relied on airborne yeasts and bacteria to leaven his doughs. Water suspensions of wheat or potato flour, standing at room temperature, were an ideal substrate for the microorganisms to develop on. Today we call this process "spontaneous fermentation." Or pieces from the previous batch were used as inoculum; this practice is still in use, to make "sourdough" bread.

Man, of course, had become well aware of these phenomena and knew how to apply them to his needs, without being able to explain them. That magic substance that leavened the dough, fermented beer, and produced alcohol was very mysterious. Leeuwenhoek had pointed out in the 17th century that yeast, when viewed under sufficient magnification, showed individual round bodies; but for some reason this information was not followed up. It remained for Pasteur, working in the last third of the 19th century, to tell us about that small dynamo, the yeast cell.

At the time of Pasteur's discoveries a yeast industry had been in existence for some time — since around 1800. Brewers furnished yeast to the baker from lager beer, a so-called "bottom fermenter." Since this did not perform as well as the "top fermenter" the breweries had previously supplied, bakers turned to a more satisfactory yeast that was available from distilleries. This prompted actual production of compressed yeast, from that used by distilleries, as a special service to the baker.

The Netherlands probably had the first industrial yeast plant; from there manufacture spread to England, France, Germany, and other parts of central Europe. Grain extracts from brewing and distilling furnished the substrates for producing compressed yeast.

Technology improved rapidly with the impetus of Pasteur's discovery and subsequent work by Hansen in Denmark. Introduction of aeration around the end of the 19th century was a tremendous step forward. Stimulation of the respiratory enzyme system brought about growth of yeast at a rate previously unknown and undreamed-of.

Molasses, primarily from sugar beets, came into use in Europe during the first decade of the 20th century as a new and simpler substrate for yeast growth, gradually replacing grain extracts. In Germany and almost simultaneously in Denmark, a new process came into use that is best known under its German name, the Zulauf process. The concentrated substrate is added gradually and continuously to the fermenting liquid under strong aeration, in amounts proportional to the growth curve. Sugar concentration is held to a minimum at all times and thus alcohol formation is reduced and yeast growth is enhanced. The high concentration of sugar possible with molasses solutions, in contrast to that of the rather dilute grain extracts previously employed, made this new process feasible.

Industrial yeast production had its start in the United States around 1870. By 1930 it had spread into Canada, Mexico, Australia, New Zealand, and Latin America. Japan now has an appreciable industry, and there are plants in North and South Africa.

Now let's see how industrial yeast production has influenced baking in various parts of the world. Although much could be said about the yeast and baking industries in the United States, the discussion will be directed to those of other countries. The table summarizes production figures and consumption rates of yeast and flour, by countries arranged in alphabetical order. (Production is calculated as pounds of compressed yeast, 70% moisture.)

Canada

Canada's 15.5 million people consume annually about 30 million lb. of yeast, about 1.94 lb. per capita. From five plants throughout the Dominion, more than 95% of the country's needs are supplied;

Table I. Annual World Yeast Production and Consumption (Approximate figures)

Country	Population	Yeast Production[a]	Per-Capita Consumption	
			Yeast	Flour
	millions	million lb	lb	lb
Australia	10	15	1.5	300
Austria	7	14	2.0	190
Brazil	65	35	0.54	...
Canada	15.5	30	1.94	190
Colombia	14	10	0.71	...
Finland	4.4	18.5	3.98	251
Iran	20	..	....	300
Japan	91.5	36	0.4	...
Mexico	33	10	0.3	80
New Zealand	2.3	5	2.17	300
United Kingdom	52	110	2.1	175
United States	175	300	1.72	167

[a]Calculated as compressed yeast, 70% moisture.

the remainder is imported from England and the U.S. Substrates are beet molasses, derived from Canada's own extensive beet-sugar industry, and some cane molasses imported from the British West Indies. It is understood that the use of sulfite waste liquor, a by-product of paper mills, has been discontinued.

United Kingdom

The British yeast industry, using the most modern techniques, produces both compressed and active dry yeast. Four plants produce annually about 110 million lb. Annual per-capita consumption is 2.1 lb., somewhat higher than that in the United States (1.72 lb.). Considerable amounts of this yeast, however, are exported to member countries of the British Commonwealth and to other parts of the world, so that the actual domestic per-capita consumption figure should be less.

The substrate is a combination of beet molasses, from domestic sugar beets, and imported cane molasses.

About 80% of the wheat used is imported, primarily from Canada, which produces the finest wheats in the world. Thus, British flour is of high quality and great uniformity. In general, it is straight-run to an extraction of 70 to 72%. Enrichment is compulsory, but levels are somewhat lower than those in the U.S. No riboflavin is added.

The bread is generally crustier, less sweet, and more flavorful than American bread. Mechanization of the industry is expanding, and there are large baking enterprises. One of these, Associated British Foods, Ltd., controls plants in Great Britain, South Africa, Australia, New Zealand, and (through its sister oragnization, Weston's) Canada and the U.S. Techniques and management policies are similar to those customary on this side of the Atlantic.

Finland

Finland has had a yeast industry since early in the present century. The largest of its three manufacturers controls about 65% of the market and is government-operated. About 80% of Finland's yeast is derived from a beet-molasses substrate, which comes largely from the country's own beet-sugar industry. Occasionally some imported cane molasses is used. A substrate derived from sulfite waste liquor is used for about 20% of total production.

All yeast is made in compressed form, and total annual production is 18.5 million lb. Home baking and home brewing account for the high per-capita consumption of 4.2 lb.

Finland's baking establishments number around a thousand. Some of these are modern, with such automatic equipment as dividers, panners and continuous proof boxes, and up-to-date ovens. The most progressive plants reportedly are considering installation of continuous dough-mixing equipment.

Among bakery products, white bread and sweet goods are most popular. Rye breads, including sour rye and yeast-leavened rye, make up 25 to 35% of the industrial output. The last-mentioned is a typical Finnish product. Some barley and oatmeal breads are made.

Austria

The Austrian yeast industry is quite old. One company had its start as far back as 1850 (see illustration). The world-famous Vienna process was originated about this time and was used by producers well into the present century. The industry is now highly developed and progressive. Four plants produce aproximately 14 million lb. of compressed yeast annually (2.0 lb. per capita).

Consumption of wheat and rye flour combined amounts to around 190 lb. per capita. Some of the six thousand Austrian bakeries are large and highly mechanized.

Rye bread, and bread made from a mixture of rye and wheat flour, still play an important part in the Austrian diet. When the large baking plants tried to abolish the time-consuming practice of sour-dough fermentation for their rye breads by substituting mixtures of lactic and citric acid, consumer reaction was thumbs-down, forcing

An Austrian yeast plant in 1850, showing yeast being skimmed from the fermenting vat. This yeast was then placed in a cloth bag and the moisture pressed out of it by the press in the background. Note man carrying the tray of yeast balls — the form in which yeast was sold.

the industry to evolve new formulas that used sour dough in combination with compressed yeast. One producer is now marketing a mixture of compressed yeast with lactic acid bacteria, to avoid using sour dough.

Production of white pan bread, similar to American white bread, is low and serves only 3 to 4% of the total bread market. This bread is produced only from straight doughs. Vienna and French bread are common. The famous Vienna hard rolls take the major share of wheat flour used in Austrian bakeries. The Kaiser roll and the "horns" in various shapes and forms are a "must" on the Austrian dinner table. Legend tells that the Kaiser roll received its name and shape from resemblance to the Emperor's crown. The crescent-shaped horn, it is said, was a contribution of Viennese bakers to celebrate liberation from a two-month siege by the Turks in 1683 — the crescent being one of the symbols on the Turkish flag.

Iran

The bakeries of Iran produce five kinds of bread. The most common is *sangak*, which is made from sour dough. The finished loaf is about half an inch thick, a foot wide, and two and a half feet long. It has a fermentation time of 2 hours and is baked on hot gravel. *Bar-bary* is very similar to *sangak*. *Lavash* and *taftoon* are made in rural homes. Both are baked in a sphere-shaped oven, preheated with firewood. When the oven is sufficiently hot the fire is removed and the dough is placed in it. These farm breads are the size of a large pancake. Another type of bread, called *noone sefeed*, is similar to French bread.

All these breads are made in rather thin loaves or sheets. This is necessary to assure adequate baking and proper sterilization of the bread when baked in the crude ovens. The bacterial count of the doughs must be great and, if the bread is not adequately baked, it is easy to see the potential danger that such bread would present to the public.

Australia

Australia has a well-developed yeast industry that started in 1911 in Melbourne; today factories are located also in Sydney, Toowoomba, and Perth. Grain substrates are used to a large extent, and only recently a change to cane molasses has begun, supplied by sugar plants in Queensland.

The Australian baking industry developed rapidly when industrial yeast production made a uniform leavening agent available. Today's annual production is about 15 million lb. and large baking plants are numerous. On a per-capita basis, the number of modern plants using the Wallace & Tiernan "Dō-Maker" equipment exceeds those in the United States. There is an active bread research institute in Sydney, as well as associations of such groups as bread manufacturers and master bakers.

Domestic wheat is plentiful. The flour differs in quality from that in the U.S. — a straight-run flour that averages lower in protein content than ours.

Sponge doughs are not used. All baking is done with the straight-dough procedure and considerably leaner formulas than are customary in the U.S. With progress in yeast manufacture, straight-dough fermentation time has been reduced to about 2.5 hours.

The orthodox baking plant uses dough mixtures of the open-bowl, low-speed type with a capacity up to 600 lb. of flour. Dividers, proofers, and ovens, slicers and wrappers are conventional.

Vitamin enrichment is optional. Normal Australian bread consequently contains about 30% of the vitamins found in U. S. bread and 60% of those in English bread. Where enrichment is practiced, U. S. standards are adhered to.

The use of potassium bromate as a flour and bread improver is permitted, but iodates and persulfates are strictly forbidden.

New Zealand

New Zealand's two yeast plants were started between 1915 and 1920 in Christchurch and Auckland. Previously bakers had to resort to the old practice of spontaneous fermentation, or use sour doughs. Today the annual production approaches 5 million lb. a considerable amount of yeast for a population of less than 2.5 million. Some of it is exported to the Fiji Islands and others.

Development of the baking industry paralleled the progress of industrial yeast production. New Zealand's baking plants are generally much smaller than those in Australia, but formulas, baking practices, and types of bread are very similar.

New Zealand is not self-sufficient in wheat production and imports from Australia. The price of flour is subsidized by the government, and a minimum extraction of 78% is mandatory. The flour is unbleached, and the attitude toward flour improvers is very conservative. Permission for the use of potassium bromate as flour improver was granted only a few years ago.

Japan

Japan has eight plants, located in Tokyo, Nagaoka, and Kyoto, and the Island of Hokkaido, all producing yeast in compressed form. Per-capita consumption is 0.4 lb. Japan's largest food staple, rice, is being replaced to some extent by bread, as eating customs are changing. Most of this is white bread. Of course, a certain share of Japan's yeast goes into the preparation of *sake* wine.

The substrate is mainly cane molasses, imported primarily from the Philippines, but one Japanese company reportedly is using beet molasses derived from domestic beet-sugar manufacture.

Colombia

Colombia's well-developed industry, producing both compressed and dry yeast, had its start sometime during the 1930's. There are three plants; one is located in Fontibon near Bogotá, and the others in Palmira and Tulua, which are in the fertile Cauca Valley where practically all sugar-cane production is concentrated. A cane molasses substrate is used.

Judged by South American standards, consumption in Colombia is heavy. About 14 million people consume some 10 million lb. of yeast annually (0.71 lb. per capita).

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Mixer with automatic flour feed and dough trough in a large baking plant in Bogota, Colombia.

tive baking industry, the plants are not modern. The volume and type of product do not warrant the heavy capital investment necessary for complete mechanization of a baking plant, and labor is cheap. There are a few large baking plants, but most bakeries are small and individually owned.

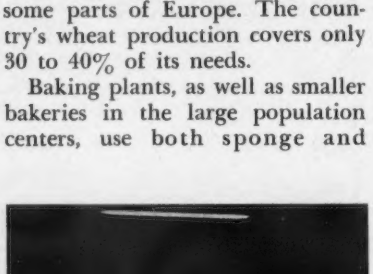
Colombia produces about 60% of its wheat requirements, most of which is grown on the plateau of Bogotá. Its wheat flour is rather low in protein content. The baker uses straight doughs with a relatively high percentage of yeast amounting to 4% based on the weight of flour. The majority of baked goods are rolls in all shapes and forms. Typical and most looked-for is the *media luna* or half-moon. French bread is also produced in large quantities and the larger baking plants are marketing some Pullman bread. One plant has recently started to produce cinnamon buns.

Brazil

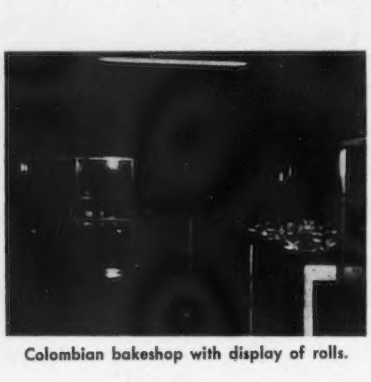
The yeast industry in South America's largest country started around 1930. Today the four plants in operation are located in Pernambuco and Rio de Janeiro, with two in Sao Paulo. These plants produce about 35 million lb. annually (0.54 lb. per capita). Both compressed and active dry yeast are produced and consumed in Brazil, all grown in a substrate derived from cane molasses, provided in adequate amounts by the domestic sugar industry.

The development of the baking industry in Brazil, as in other parts of the world, was stimulated by advancements in industrial yeast production which provided the baker with a reliable and uniform leavening agent. Well-mechanized baking plants can be found in Rio de Janeiro and Sao Paulo. However, as in Colombia, the degree of mechanization never approaches the extent found in baking plants in English-speaking countries or some parts of Europe. The country's wheat production covers only 30 to 40% of its needs.

Baking plants, as well as smaller bakeries in the large population centers, use both sponge and straight doughs. One can find Pullman bread, French bread, Swiss bread, Vienna-type rolls, sweet rolls, and practically any familiar bread variety. But things are somewhat different in the country. The typical bakery of a small country town in the state of Sao Paulo, for instance, uses a very lean dough for bread somewhat similar to French bread. Apparently the same dough is used to make a rather tough hard roll.



Colombian bakeshop with display of rolls.



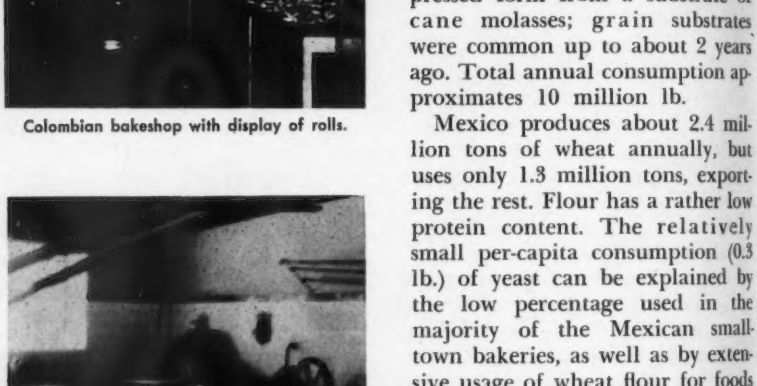
Corner of a Brazilian bakery, showing the dough mixer and work benches.

Mexico

The well-developed Mexican yeast industry takes care of about 85% of the demand; the remainder is imported as compressed and active dry. All three plants, located in Mexico City, produce in compressed form from a substrate of cane molasses; grain substrates were common up to about 2 years ago. Total annual consumption approximates 10 million lb.

Mexico produces about 2.4 million tons of wheat annually, but uses only 1.3 million tons, exporting the rest. Flour has a rather low protein content. The relatively small per-capita consumption (0.3 lb.) of yeast can be explained by the low percentage used in the majority of the Mexican small-town bakeries, as well as by extensive usage of wheat flour for foods other than bread. In the larger population centers, like Mexico City and Monterrey, large and well-mechanized plants produce an American type of pan bread, soft

(Please turn to page 329)



Bake-oven in Brazil, similar to those used in Colombia.

an eminent cereal chemist emphasizes the importance of

Bread as a Daily Food

By P. F. Pelshenke

Federal Grain Research Institute

Detmold, Germany

THE FOOD OF mankind has been subjected since the war to comparative and summary consideration through basic scientific research, the results of which have been presented in two comprehensive reports. In 1946, and again more recently, the Food and Agriculture Organization of the United Nations (FAO) has examined the question of how the food of different peoples is made up, how it has changed compared with fifteen or twenty years ago, and how world production of food stands in relation to the consumption of individual countries and to the needs of the whole world, if everybody is to have a sufficient and comparable diet.

The researches have a very wide material basis, statistically certified and embracing 80 countries and 90% of the world's people. The statistics offer an excellent basis for investigation of the role of bread as a food, both in individual nations and as a world average.

The results of the researches in general are summarized in a statement that is of extraordinary importance for present-day mankind. For many people who live in countries with sufficient of the necessities of life, it may be quite astonishing:

> Half the people on earth are suffering from hunger: they are insufficiently or badly nourished.

Before World War II, 39% of the world's people did not have enough food. In the period 1949 to 1959, 59% did not have enough; 58% did not have a balanced diet, particularly where proteins were concerned.

We know from history that in all times many people have not had enough to eat. Periods of very marked hunger have sometimes given rise to the most violent political convulsions.

The full weight of the problem becomes apparent if we consider the great extent to which insufficient nourishment influences man's capacity to work and his resistance to diseases, child mortality and the growth of children, man's happiness and unhappiness, his expectation of life, and the keenness of his intellect.

Against this impressive statement about the high proportion of mankind which is insufficiently nourished, however, we may set the happier conclusion that in spite of a constant increase in population figures the food-producing industries can point to growing reserves, both present and potential. We may hope, therefore, that common efforts on the part of all peoples will succeed in providing more food for the starving.

Theodor Roemer, the celebrated agronomist, in the latter years of his life brought his wide knowledge and experience to bear on this question in a very thorough examination, and answered it in a completely positive sense: Only with an increasing population will we in the future be able to produce enough.

Let us leave these general observations and examine the role and importance of bread in feeding various nations as demonstrated by UN statistics.

Bread in the General Food Scheme

It is not possible to distinguish statistically between consumption of grain in the form of bread and that in the form of porridge. When I speak of bread consumption, therefore, I refer to its widest sense—strictly speaking, the consumption of grain.

If we consider the proportion of grain in the total amount of food eaten, on the basis of the present statistics, we find that it varies between different countries from 18 to 80%. In the countries of the Near East, bread comprises, on the average, 70 or 80% of the total food consumed; in North America, on the other hand, it comprises less than 25% of the total. That means that in the one area each person eats sixteen slices of bread every day, and in the other area each person eats only five slices a day.

Let us take a quick look at the proportion of the total food eaten that is made up by bread in various individual countries.

In Europe, the Rumanians, the Italians, the Greeks, the Bulgarians, the Hungarians, and the Yugoslavs are the greatest bread eaters. Bread, for them, makes up 60 to 75% of their food; on the average they eat 820 g. (roughly 2 pounds) of bread per person per day.

Poland, Finland, Czechoslovakia, Austria, France, and the Iberian peninsula also have a high bread consumption. The lowest, on the other hand, is that in Sweden and The Netherlands.

On the American continent bread takes pride of place in the diets of Mexico, Chile, Peru, and Venezuela, where it provides 44 to 60% of the nutritional requirements. It is less important in the diets of the United States, Canada, Paraguay, and Colombia.

Variations in bread consumption are particularly wide in Africa. Forming 60 to 70% of the total intake, bread consumption is very high in Egypt, French North Africa, French West Africa, and the Union of South Africa. In Kenya, Uganda, and the Congo, roots are

eaten to supply carbohydrates and grain supplies only about 25% of the total amount of food needed.

A very great amount of bread is eaten in the Middle and Far East. The peoples of Iran, Iraq, and Pakistan satisfy roughly three-quarters of their daily needs with bread, and grain supplies the porridge-eating peoples of the Far East in every case with at least two-thirds of their requirements; in Indochina as much as 80%. Australia and New Zealand, with bread forming between 28 and 30% of the total diet, have low consumption.

Generally considered, the consumption of bread in the world today varies between 45 and 296 kg. (91 and 666 lb.) per head per year on national averages.

The Symbol of Man's Food

From these statistics the conclusion is inevitable that in all countries bread is the pricipal foodstuff. In 53% of countries it supplies over half the total amount of food required, and in 87% of countries, over 30%. These figures make it clear that today, as in Biblical times, bread is the symbol of man's food. In all parts of the world it supplies him with more food than any other single source. In the countries of Western Europe it supplies him with an average of half the carbohydrates, a third of the protein, and at least 50 to 60% of the B vitamins and 80% of the E vitamins in his diet.

We know, however, that a diet is complete only when it is made up of vegetable and animal foods together, since the different types of food complement each other. A diet in which more than two-thirds of the food is supplied by vegetable proteins such as grain is not balanced: it is incomplete. If we look at the diets of the peoples of the earth from this point of view, we find that 24% of them eat more than this limit for vegetable proteins in the form of bread alone.

Hunger Must Be Satisfied

Yet another interesting and important conclusion has been reached by UN experts: In spite of the surpluses of grain that are at present in storage in various parts of the world, the production of bread grains must be increased by 19%, side by side with all other foodstuffs, before the appetite of hungry mankind can be satisfied. The figures I have quoted are careful estimates that take into account the fact that food needs differ in different parts of the world. They are not based on the high intakes of food common in countries that have a high standard of living, but on the amounts that modern nutritional science has established as the minimum necessary for a human diet.

For those who are familar with the techniques of agriculture, this raising of the level of grain harvests presents no serious problem in view of the advances of techniques and knowledge. National average grain yields vary between 8.5 and 41.5 bushels to the acre. By the introduction of higher-yielding and more resistant strains, by planned fertilization and irrigation, by bringing marginal lands under the plow, and by the use of modern methods of cultivation and modern machinery, an increase in harvests of one-fifth could be made possible in a comparatively short time. In fifteen years, for example, the bread grain surpluses in North America have increased fourfold. In the actual carrying out of such a planned increase, however, we should be faced with a task of immeasurable proportions. Since the turn of the century the world average grain yield has increased by only three-quarters of a bushel per acre, or about 4%. Compare this fact with the mighty potentialities of development and increase that science and technology have put into the hands of agriculture and food production. But almost 50% of the world's farmers still use Biblical methods of cultivation.

Is it not a tragedy that the generations of the last hundred years, with their colossal inventions that have showered blessings on one part of mankind and assured it of a better life, have not yet been able to conquer hunger and relieve man of anxiety about his daily bread?

The last hundred years of human history have produced more technical progress than all the thousands of years that have gone before – there can be no doubt of that. In this short time we have brought into our service steam power, the internal combustion engine, and electricity; we have demonstrated the existence of disease germs, we have discovered anaesthetics, found new ways of combating infectious diseases, and opened up the fields of synthetics, electronics, and nuclear fission, to name but a few of the more impressive advances. We are experiencing not a steady technical progress, but one that is constantly accelerating. Automatically controlled power is conquering the world. We dream of a shorter working week, of a higher standard of living, of leisure to make life finer and friendlier, of even greater expectation of life, of the enjoyment of the masterpieces of art, music, and literature. We seem to think that when we have fully mastered technology a new flowering of the spirit will take place. But in spite of all our achievements a great number of our fellow men live today, as always, in fearful anxiety about their daily bread. At their miserable meals, tormented by hunger and malnutrition, they can only regard their struggle through life and their poverty as visitations of God.

The average age at death of these hungry people is only half of that in better-fed countries. Up to 90% of them suffer from acute infectious diseases as a result of malnutrition, and the infant mortality rate is three or four times as high as in Western Europe and North America.

One particular difficulty lies in the fact that, in spite of malnutrition, disease, high infant mortality, and wars, the population in several of the crisis areas continues to increase at an extraordinary rate – in some cases as fast as the world average.

We should remember too, that the statistics we are dealing with here represent only the averages. In individual cases the circumstances are even worse. In some countries of the Orient, calorie intakes as low as 1,100 and 1,200 per capita per day are found. The food intake consists of 85 to 90% bread, the rest being made up of bean porridge and very small amounts of milk products. This applies particularly to country peo-

ple, who besides all this have to work very hard.

The importance of the daily bread became clear very early to people and their rulers. At the time of Egypt's Middle Kingdom, 4,000 years ago, Aman-am-Hat left his sons and successors the following advice: "Everything I commanded made me beloved. Seek you also agreement between yourselves and the people." And the same wise Pharaoh, whom Egypt has to thank for many wise agricultural measures and whose reign belongs to the most glittering epoch of Egyptian history, could say of himself: "I commanded that the seed should be sown, and I loved the god of harvest. The Nile greets me. No man went hungry under my rule." This was the first time in human history that a ruler boasted, not of his wealth, or of the splendor of his court, or of his victories and campaigns, but of giving his people enough to eat.

Bread in World Trade

We can measure the part that bread plays in the life of man also by measuring the value that it represents.

According to international statistics the grain used for human consumption alone exceeds in value the world production of iron and steel by 2.6 times and the world production of coal by 1.7 times. Even in an industrialized country like Germany, where on a statewide average only twenty out of every hundred people still live on the land, the value of the bread and allied foods produced is as high as five billions of marks (DM 5,000,000,000), equal to the whole of the iron and steel production including the products of the rolling mills.

Although only 14% of the grain produced in the world is handled on the world markets, the volume of grain dealt with forms more than half of all the goods in overseas trade.

Bread and Civilization

Incomparably greater than bread's importance in the feeding of individuals and nations, far greater than its importance in world trade, is its importance in the realm of the cultural and the ideal. Man owes his civilization, quite simply, to bread. The introduction of grain-growing and bread-eating in prehistoric times, the evolution from hunter to farmer, was one of the significant events in human history – an event whose effects we are even today hardly able to measure. A single nomad needs 20 square kilometers to support him. The same area, plowed and cultivated, will support 6,000 people. In the nomadic stage of human development all the earth's fruitfulness could feed scarcely thirty million people. Today it feeds 2.3 billions – about 76 times as many.

With grain and bread man provided himself with a food that does not spoil quickly, that he can store for a long time, and that can be prepared in many appetizing and tasty ways. It is rich in nutritional and energy-giving elements, available in a harmonious balance that is hardly to be found in any other food. In spite of this it is still, as it has always been, the cheapest of all foods.

Modern man is inclined to ascribe the greatest importance to the great inventions and discoveries of the past few decades. But the precondition for all the pioneering developments of human intelligence was the development of leavened bread – a discovery attributed to the Egyptians at the time that Cheops was building his Great Pyramid in the valley of the Nile. The cultivation of grain and the baking of bread caused agriculture, farms, villages, and towns to grow and thus started the cultural and economic rise of man. No high civilization has developed anywhere in the world without grain and bread.

A food grain is just a tiny seed, but even after many years of research it still has many secrets hidden in it. The longer and more intensely we concern ourselves with it, the more deeply we are impressed with the miracle that it represents and with the tremendous forces that are hidden in it.

Our daily bread has undergone a singular and wonderful development in the course of human history. Consider, for instance, the bread that is still made in the highlands of Abyssinia, from the tiny grass seed, *Poa abessinicum*. A single grain of this Abyssinian bread grain weighs only one one-hundredth of the weight of a present-day wheat grain. Think of the revolution that the breeding of modern grain types has brought about – millstones and baking ovens, wind and water mills, sour dough and the introduction 100 years ago of yeast, the roller mill, the modern sifter, the continuous oven, and all the hygienic possibilities that modern technology offers today to the miller and baker! What examples science has shown us! No less a man than Justus von Liebig, at the beginning of the present scientific era, found himself inspired afresh, as he tells us in his letters, by bread as an object of research, and he produced results that have value as well as interest for us today.

People in highly civilized communities, however, are inclined to pay little or no respect to those things that people in more primitive circumstances find of most value – things which belong to the very foundations of human existence. This, I think, explains the current tendency to undervalue bread – a tendency that is encouraged by the low cost of bread. It explains too the varying conceptions of bread, ranging from the most ordinary of foods to bread as sacred food, from bread as positively unhealthy to bread as the indispensable food, the most nourishing there is.

In all periods of history, however, bread has been accorded a sacred value. In the dawn of history bread itself ranked as a godhead, and in many parts of the earth today, where life is hard and hunger rages, bread is still regarded as holy.

Bread has created wealth: where bread has been short, where there has been no social justice, famine and revolution have broken out and great nations have fallen.

The Roman Empire, and many states since then, paid high respect to the miller and baker. They were important and respected citizens and were accorded privileges because they practiced the high mysteries of milling and baking. The thoughtful man at all periods and

(Please turn to page 329)

interest, effort, and enthusiasm pay off when you are

A Program Chairman with a Purpose

By Walter T. Greenaway
USDA Research Center
Beltsville, Maryland

A FISHERMAN WHO lands a salmon, a bridge player who scores a grand slam, or a music lover who hears Tchaikovsky's *Swan Lake,* all know the kind of thrill I experienced last year in arranging eight programs for the Chesapeake section.

My purpose was to test a hypothesis which I had developed from observing and analyzing meetings since the start of our section in March 1955. It seemed to me, other things being equal, that there was most enjoyment by members when the program chairman was keenly interested in the speaker's subject and had kindled a receptive attitude in the audience prior to or during the introduction. Conversely, if the program chairman's interest in the speaker's subject was shallow or he had not prepared his audience, then it required an unusually effective speaker to maintain the interest of the audience for the entire lecture.

Testing The Hypothesis

Last September when the responsibility for arranging the programs became mine, I decided to test my hypothesis by the following procedure:

1. Used my deepest professional interests associated with cereal chemistry as a foundation for the meetings.
2. By correspondence, arranged for speakers who were specialists in this particular interest. Also I read their publications that were available.
3. Made the speakers known to the Section by appropriate statements in the announcement letter.
4. Where possible, met the speaker at the terminal and brought him to visit our laboratories and personnel prior to the dinner.

The criteria for judging the hypothesis would be comparative attendance at meetings. If those attending found the speaker's information of real value as well as interesting, chances were good that they would come to the next meeting too, and perhaps bring others. But if a member did not find the meeting of any value, the chances of his returning would be poor.

The Plan

Though it is a number of years ago that I taught the subject of yeast and fermentation at a brewing school, this strong interest has remained wih me undiminished. Acting upon knowledge that liquid or dough fermentation is brought about by the enzymes of yeast working on the carbohydrates and proteins of cereal grains, I arranged for five lectures, closely related in subject matter yet distinctly different:

Yeast in Dough and Brew Fermentations, by Sutton Redfern, Fleischmann Laboratories

The Browning Reaction, by John A. Johnson, Kansas State University

Lysine, Sorbic Acid, and Glucono-Delta-Lactone in Baked Products, by Joan Griffin, Charles Pfizer & Co.

The Present and Future of Enzymes in the Baking Industry, by Otto Silberstein, Wallerstein Co.

Some Problems of Milling Cereal Grain, by Lynn Pankey, Wilkins Rogers Milling Co.

Having also a strong interest in foreign agriculture which is motivated by a desire to know and understand the world, I found it relatively easy to contact the embassies in Washington, to arrange for some of their agricultural experts to speak to us. This interest served as the basis for the remaining three lectures:

Agriculture in the Soviet Union, by Peter Pogodin, Agricultural Counselor, USSR

My Impressions of the Grain Program as I Saw It Operate in the USSR, by Lawrence Zeleny, USDA

Agriculture in the Union of South Africa, by L. L. Roux, Agricultural Counselor of Union of South Africa

Four months before the date of each scheduled meeting I wrote to the company or embassy which I knew could furnish the kind of speaker I had in mind. The first thrill came with the response to my letters. Without exception, each of the companies thanked me for the request and informed me that my letter had been passed on to one of their technical personnel, from whom I would soon receive a letter of acceptance. There then followed a number of communications regarding the announcement, hotel accommodations, and terminal meeting places. The company policy of defraying the expenses of the speakers is highly commendable, especially since there were no discernible sales angles. The speakers were dedicated scientists who shared their knowledge with us.

The response from the embassies,

although very rewarding, was not as complete nor as reliable as with industry. Some were not in a position to send us an agricultural expert; others indicated they would be pleased to do so, depending on whether the person were in the country at the time. However, three lectures were arranged that dealt with foreign agriculture.

Responsibilities and Rewards

Procuring the speaker was the first of the three major responsibilities of my position as program chairman. The second was to get good attendance for the meeting. The third was to meet the speaker at the terminal, spend as much time with him as possible, and then introduce him at the meeting.

Obtaining good attendance depended to a large extent on mailing an appealing announcement a week before the meeting—a very important and integrated part of the chairman's responsibility. The return of the self-addressed post cards brought the second thrill. The number of cards returned within four days enabled me to judge whether a successful meeting was in the making. In only one instance was I alarmed about the prospects. Calling on my resourcefulness, I invited six of my friends to come and be my guests (and boost the number in attendance). Fortunately not all of them accepted. I managed to eat normally for the rest of the month and was able to make my mortgage payment.

Meeting the speaker at the railway terminal or airport was an especially enjoyable experience, thanks partly to our previous communications. Interest was heightened at three meetings by trips through a brewery, the Agricultural Research Center, and a milling company, accompanied, of course, by the speaker. Although the entire day of the meeting involved the pleasurable duties of making introductions and the exchange of new ideas, the final thrill of a job well done came during the three minutes spent in presenting the speaker to the audience. The mental soil had been prepared for the seed of ideas, and the harvest of intelligence would be good.

Attendance for the year increased a significant 56 per cent. My fellow officers and colleagues were very co-operative; there were times, I must admit, when I could not have said whether the improvement was due to an effort on their part to encourage me by attending meetings just out of kindness, or whether it was really due to my method.

May I suggest that you try it?

Bread

FROM PAGE 327

in all parts of the earth has always realized that his daily bread is holy and must be treated with respect and awe.

Resume

Let us return for a moment to the point from which we started.

A large proportion of mankind has not enough bread. There has never been enough bread in the world, and in spite of all the achievements of our modern age, in spite of the progress of science and technology, which have shown us many new ways of producing and providing more food, there is no evidence that the number of hungry people is getting any smaller; in fact, it is numerically higher than ever, because of the increase in population. Modern transport has brought the regions of the world closer together, but it has not made the contrasts any less.

Our daily bread sets a problem that applies to the whole of mankind. The question has recently developed into one of human conscience, into a task of the first importance. In all religions help for a needy neighbor is one of the foundations of religious activity: areas of crisis, unrest, and war correspond frequently throughout history as well as today with areas of hunger. It is not our place here to point out the ways that must be followed to solve the problems, or to describe the forces that are always active. One thing, however, is certain: without international cooperation, without mutual assistance among men, there can be no progress.

In the name of many nations the steps being taken to improve the production of food, of our daily bread, are being made together. How fine it would be if in the future we could look back and recognize as a symbol the fact that not only the citizens of today's great nations, but the primitive and underdeveloped peoples as well, took part in this great work. It is for us a task and a duty—a common task and common duty of mankind—to conquer the hunger in the world, because we believe, as Friedrich Schiller believed, "The world has room for all."

Yeast

FROM PAGE 324

buns, and rolls. In the majority of small bakeries the most common breads are *bollilos* (hard rolls) and *pan dulce* (sweet goods).

Acknowledgment

The author would like to express his appreciation to all his friends who provided information for this report. They include: Mohsen Motamedi, Tehran, Iran; Robert Bottomley, Sydney, Australia; Milan Salonen, Lahti, Finland; Carl Rokitansky and Herbert Wutzel, Vienna, Austria; and Red Star's Export and Market Research Departments.

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AACC PARTICLE SIZE COMMITTEE REPORT: 1961

P. R. CROWLEY, Chairman; M. L. ANDERSON, R. GRACZA, B. GROGG, A. R. HANDLEMAN, F. W. WICHSER, and K. T. WHITBY, Consultant

AT THE ANNUAL AACC convention in Dallas, the Mine Safety Appliance-Whitby Centrifuge method of subsieve particle size analysis was recommended by the Particle Size Committee for inclusion in *Cereal Laboratory Methods.* This recommendation was given first approval by the Association at the business meeting, and the method will appear in the 7th edition of CLM to be published in 1962. In order to make this procedure available to Association members at an earlier date, the method is offered in mimeographed form (see Editor's Note). The reasoning behind the selection of the method is given herewith.

The Particle Size Committee selected the MSA method after extensive consideration of the various methods now in use in the cereal processing industry. The choice was based on requirements of the industry as determined by a survey reported previously (3), and the performance of various subsieve sizing methods as established through an interlaboratory testing program. The methods examined included the Coulter Counter (2), a modified version of the Andreason Pipet (1), the MSA centrifuge method (5), the Sharples Micromerograph, the Simon Sedimentometer, and the Evans sedimentation method (4). The specific procedures used by participating analysts were those normally employed in their individual laboratories. In the case of the MSA method, an operational schedule was suggested so that data would be obtained at particular particle sizes; data from the other methods were collected at the same particle sizes but operational schedules were worked out by the analysts.[1]

Table I. Factors Used in Selection of Method

Method	*Laboratory*	*Av. Time per Analysis* minutes	*Equipment Cost*	*Operator Training Time* days	*Precision (95% Conf. Level)*[a] *Within-Laboratory*	*Overall*
Coulter Counter	(1)	40	.....	2	± 5.5	
	(2)	35	$4,000	7	4.8	
	(3)	29	4,200	7	2.3	
	All	35	4,100	5	± 4.2	± 11.2
Andreason Pipet	(4)	85	.....	3	± 3.0	
	(5)	40	500	7	2.8	
	All	63	500	5	± 2.9	± 3.8
MSA	(6)	24	1,600	3	± 4.2	
	(7)	19	1,500	7	2.6	
	(8)	10	1,200	14	3.0	
	(9)	20	1,800	..	2.6	
	(10)	35	1,000	14	2.4	
	All	22	1,400	10	± 3.0	± 5.7
Sharples	(11)	30	8,500	7	± 2.4	...
Simon Sedimentometer	(12)	270	40	..	± 3.4	...
Evans	(13)	60	.....	..	± 0.7	...

[a] Precisions were calculated by doubling average standard deviations of the cumulative distribution functions at various particle sizes and are expressed in percent. Values obviously more than 3S and values at cumulative distribution functions of 0 and 100% by definition were not included in the averages.

Replicate size analyses of a group of wheat flour samples were made by Committee members and a number of other workers to evaluate the precision of the various methods. In the cases of the Coulter Counter, Andreason Pipet, and MSA centrifuge methods, more than one worker submitted results, and it was possible to evaluate interlaboratory precision. All collaborators provided information relative to equipment cost, average time for analysis, operator training, etc.

Because of space limitations, it is impossible for the Committee to present the complete listing of data acquired during the study. However, Table I includes a brief summary of these data. A representation of size distributions from the various methods is shown in Fig. 1. For comparative purposes, Fig. 2 shows size distributions of the same flour obtained with MSA equipment in the various participating laboratories.

One of the obvious conclusions which can be drawn from the data in Fig. 1 is that the various methods of analysis do not give identical results. Although most of the methods are presumably measuring the same size characteristic[2], the biases introduced by the specific techniques are sufficient to cause gross differences between methods. This fact is recognized by most workers concerned with particle size measurement but bears frequent repeating.

Also, since all of the methods studied are biased to some extent, it is not possible for the Committee to suggest that one method measures true Stokesian size; the selection was based on other factors.

[1] It should be noted that as a result of the Committee's study, Coulter Counter representatives are developing an operational procedure specifically for wheat flour in an effort to improve the precision of that method. Information concerning this procedure may be obtained from Mr. Shepard Kinsman, Coulter Industrial Sales Co., 2525 N. Sheffield Ave., Chicago 14, Illinois.

[2] With the exception of the Coulter Counter, all the methods yield size in terms of the Stokesian diameter.

The factors used by the Committee in making the selection are listed in Table I. Unfortunately, no method excelled in all areas, and as a result a compromise had to be made as to which method would best satisfy the needs of the industry. It was the Committee's decision that the MSA method, because of its relatively low time requirements, good precision, and nonexcessive cost, is the best compromise based on the available data. This does not assert that certain of the other methods are not superior in particular respects, or that other methods not included in the study are not altogether better. However, at this time, the Committee is in agreement that the MSA method can generally be used as a standard by the cereal industry and feels that individuals or organizations having special requirements can choose another method or methods which, for some reason, may better satisfy their particular requirements.

The specific procedure recommended by the Particle Size Committee for use with MSA equipment can be obtained as indicated in the Editor's Note, below.

Members of the AACC who use the procedure are solicited by the Committee to submit comments or criticisms to the Committee as to the utility of the method.

EDITOR'S NOTE: *The method for Particle Size Distribution of Flour is available to interested parties in mimeographed form from:*

AMERICAN ASSOCIATION OF CEREAL CHEMISTS
1955 University Ave.
St. Paul 4, Minn.

Fig. 1. Comparison of the size distribution of a wheat flour as measured by different methods.

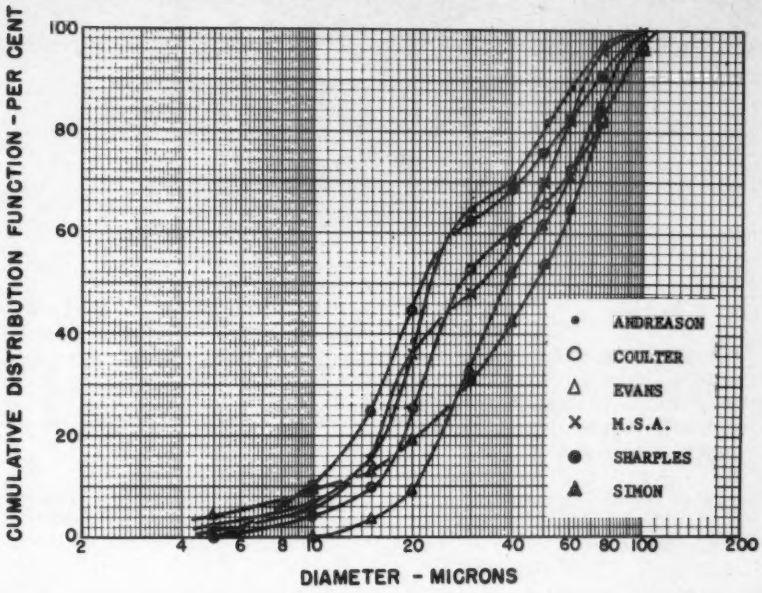
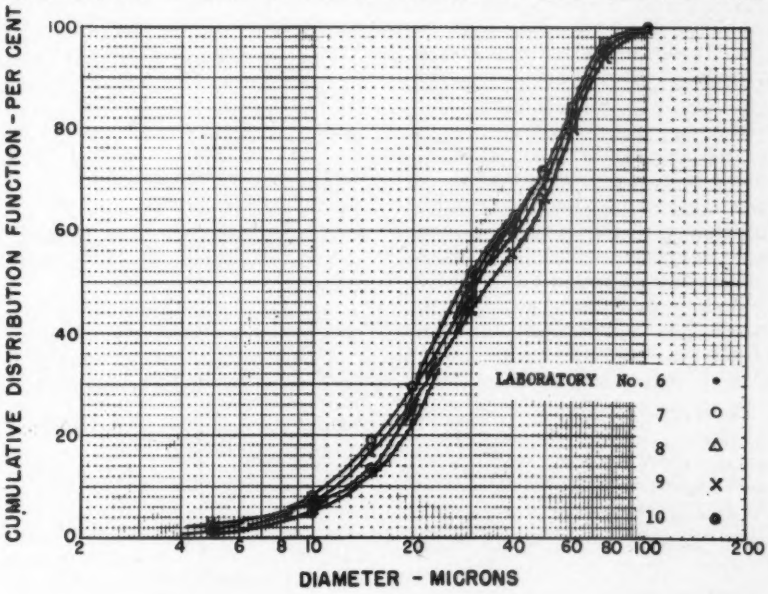


Fig. 2. Comparison of the size distribution of a wheat flour as measured by the MSA method.



Acknowledgment

The Particle Size Committee gratefully acknowledges the generous cooperation of V. F. Pfeifer, V. J. Evans, Gene W. Lenser, and J. G. Ponte, who assisted in the study.

Literature Cited

1. ANDREASON, A. H. M. *Kolloid-Behefte 27:* 349 (1928).
2. BERG, R. H. ASTM Special Tech. Publ. No. 234, p. 245 (1959).
3. CROWLEY, P. R. *Cereal Sci. Today, 6:* 30 (1961).
4. EVANS, V. J. *Cereal Sci. Today 5:* 40 (1960).
5. WHITBY, K. T. *Trans. Am. Soc. Heating, Ventilating Engrs. 61:* 33 (1955).

People, Products, Patter

• • • People

J. A. Anderson of Canada's Grain Research Laboratory, Winnipeg, spent 3 weeks visiting the People's Republic of China during the past summer. **I. Hlynka** attended the Fifth International Congress of Biochemistry at Moscow, and then made a post-Congress tour of various cereal laboratories in Austria, Switzerland, Germany, Belgium, France, and England. **G. N. Irvine** visited the Philippines, Hong Kong, Japan, Iraq, Greece, Cyprus, Malta, England, Germany, Spain, Portugal, France, Algeria, and Austria.

John Andrews, director of food research, General Mills, Inc., and **W. R. Johnston,** v-p research, International Milling Co., both of Minneapolis, were representatives of the milling industry and **Howard Morton,** director of utilization research programs, Great Plains Wheat, Inc., Garden City, Kansas, represented wheat growers at the meeting in Albany, Calif., of AIB'S Technical Committee for Liaison with USDA, October 22 and 24.

Vance V. Goodfellow joins staff of Crop Quality Council, headquartering in Minneapolis; has served for 10 years as Associate State Entomologist stationed at North Dakota State University, Fargo.

Simon S. Jackel named head of New York laboratory, Quality Bakers of America Cooperative, Inc.; to fill the vacancy caused by the recent passing of **Oscar Skovholt.** Dr. Jackel comes from Vico Products Co. of Chicago, where he was Director of research. He will supervise the QBA's quality product control program for its 137 member-bakeries.

John M. Manypenny named western division manager for E. H. Sargent & Co.'s new headquarters in Anaheim, Calif. **B. G. McKay** named assistant division manager and **Richard C. Duda,** supervisor of technical service.

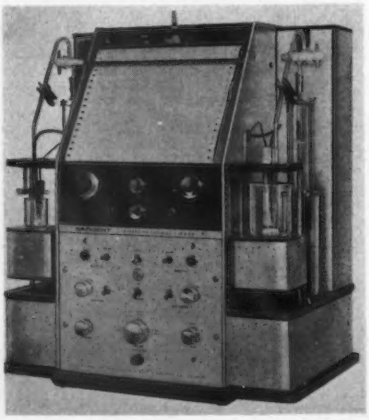
Charles W. Matthaei named president, Roman Meal Co. of Tacoma; formerly vp (since 1955). He joined the company in 1947 and held various sales and management positions; was instrumental in development of new products and merchandising techniques. **Wm. P. Matthaei,** who was president and chairman of the board until now, continues in latter capacity.

Glen E. Morin named division controller, The Pillsbury Co.'s industrial products area; from company's computer study group for the past year, and previous positions in cost and accounting area. Replaces **John Kidney,** resigned.

Leonard Waldt appointed senior food technologist, Fine Chemicals Research Lab, Chemical division of Shulton, Inc.; from chief food chemist at Morningstar-Paisley, Inc.; previously associate food technologist for General Foods Corp.

• • • Products

• **A new recording titrator** for all potentiometric and pH titrations has been developed by E. H. Sargent & Co. This intrument, according to the announcement, is an all-purpose recording titrator with dual, motor-driven titrating assemblies, multiple direct-reading pH and millivolt ranges, and an automatic rate-sending and adjusting system to prevent curve distortion in slow-reaction systems. The manufacturer states that the titrator can be used for all types of potentiometric titration, with either glass or metal electrode systems, in which end points are determined either from a recorded curve or by automatic interruption of titration at a predetermined pH or voltage value. (1)



• **Solution metering pump.** Beckman Instruments, Inc., offers an illustrated, 2-page bulletin describing the features, specifications, and operating principles of this new pump, designed for any application where small quantities of fluid must be delivered precisely. The pump is available in four ranges: 0–2, 0–5, 0–10, and 0–20 ml./minute. The desired flow is set in thousandths of ml./minute on a precalibrated knob. Delivery is said to be accurate to ± 2% of the pump's range; repeatability ± 0.5% of rated capacity. Other features as described are: pump is corrosion-resistant and easily disassembled for cleaning or sterilizing; mechanically actuated valves are used for precise, leak-free performance at low pressure. Bulletin 794. (2)

• **An enzymatic product for food processing,** Hydralase® D, is described in a new data sheet as a high-potency mixture of diastatic enzymes; a highly purified, free-flowing, and completely water-soluble powder. Principal use is in amylolysis, for conversion of starch into such soluble products as sugars and dextrins; some major applications are in the production and processing of high-conversion corn syrup, precooked baby foods, and breakfast cereals. Nopco Chemical Co., the manufacturer, states that it is approved by the U.S. Food and Drug Administration, and is permitted in Standards of Identity for bread and rolls. They offer a data sheet, and technical assistance. (3)

• **Brochure on tracer technique.** Micro Tracers, Inc., offers a new brochure entitled "5 Minute Assays," describing a nonradioactive tracer technique for detection and determination of microingredients in dry mixes, and for determination of completeness of mix. (4)

AN INSIDE LOOK AT FLAVORS THAT SELL

Look closely at a successful cereal. Taste it, compare it. Why is it some flavors have compelling consumer appeal?

IFF flavors sell and resell for two important reasons. They are exclusively designed for your product, your markets—and they are the finest flavors available. IFF flavors have stimulated new product ideas, improved stability and shelf-life, and created brand-building sales the world over.

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• • • **Patter**

A reduced price for lysine, to $4.50 per pound from $4.95, is announced by Merck & Co., Inc. This is one of several reductions permitted, the announcement says, by improvement in the manufacturing process and increased sales.

• • •

"Amprol" released from withdrawal clause. Merck Chemical Division announces that its coccidiostat, "Amprol," may now be used in broiler and turkey poult rations right up to marketing time, because of withdrawal by the FDA of a restrictive clause requiring local feed mixers to clear with the Administration. Thus, according to Merck, "poultry operations will be streamlined; there will be no need to carry both medicated and nonmedicated rations." Production facilities are being expanded to meet an increase in market demand.

• • •

Conference on stored-grain insects. The second conference on insects in stored grain and their control was held at Kansas State University, Manhattan, from noon November 15 to noon November 17. The program covered insecticidal and other control measures and stressed the variable conditions that affect control procedures; included were informal discussions on basic facts and principles. The conference was not for specialists or persons who are already well informed, but for those who had not attended previous conferences.

Speakers and discussion leaders included members of the KSU entomology staff and the Stored Grain Insects Laboratory, Agricultural Marketing Service, USDA. John A. Shellenberger spoke on effects of storage conditions and grain quality at the banquet. Assisting the KSU Department of Entomology were the Department of Flour and Feed Milling Industries; KSU extension division; Stored Grain Insect Laboratory; Kansas Wheat Improvement Association; and Kansas Grain and Feed Dealers Association.

• • •

Conference on USDA wheat utilization research. At a meeting in Albany, Calif., on October 23 and 24, the American Bakers Association's Technical Committee for Liaison with USDA heard and discussed reports of 12 research projects currently under way on flour and baking.

Emphasizing the basic problem of nonuniform baking performance of flours, chairman R. H. Cotton said in his opening remarks that "there must be fundamental studies on chemical composition and physical structure of flours and doughs and of changes during conversion to baked goods." He added that "fortunately, good work is now under way in the USDA laboratories at Albany, Calif., and Peoria, Ill., the American Institute of Baking in Chicago, and several universities and institutes, here and abroad."

Among other committee members attending were W. B. Bradley, who reported AIB studies on bread flavor and on nutritional factors in wheat and flour; and L. F. Marnett, who reported studies supported at Midwest Research Institute on molecular shape factors for gluten proteins.

Researches on chemical and physical properties of wheat proteins occupied one afternoon. Their purpose is to extend knowledge of composition and thus identify factors involved in baking performance. J. H. Woychik of USDA lab in Peoria reported studies on gluten fractionation and components. Studies on protein solubility changes during dough mixing, on albumin and globulin contents of air-classified flour fractions, and on fractionation of flour albumins were reported from the Albany lab by D. K. Mecham, H. A. Sokol, and C. C. Nimmo.

Air-classification milling studies are under way at the Northern and Western utilization research labs: milling technology and nonfood uses of fractions at Northern, and food uses at Western. A. C. Stringfellow showed photomicrographs of the fractions and distributions of their protein contents among varieties of wheat and other cereals. Some of the smallest-particle fractions contain over 30% of protein. J. W. Pence reported baking studies which have shown that high-protein fractions of varieties may differ widely in breadmaking quality.

Much interest centered on the researches on bread flavor. Advanced studies of flavor components derived from fermentation and gas chromatographic analysis were reported by E. W. Cole and R. J. Horvat of the Albany lab. With recently developed equipment it is now possible to obtain a quick analysis of flavor components in the vapor above a food sample. This "aromagram" may prove useful in plant control as well as in basic studies of composition of volatile flavor.

Studies on possible savings from freezing were reported by Norman Rollag of USDA's Agricultural Research Service and C. L. Rasmussen of the Product and Process Evaluation Staff, ARS.

A copy of the opening address by Dr. R. H. Cotton, entitled "Principal Technical Problems of the Baking Industry" (4 pages, double spaced), is available on request to the author, P. O. Box 731, Rye, N.Y.

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SITUATIONS OPEN

Large shortening manufacturer has excellent opportunity for male scientist with several years' experience, who is seeking challenging position in baking laboratory. Product development and customer service, no direct sales responsibility. Occasional travel entire United States after training period. Reply to Dept. 55, CEREAL SCIENCE TODAY, 1955 University Ave., St. Paul 4, Minn.

EXPERIMENTAL BAKER. Experienced baker wanted, to supervise pilot-plant production and work with experimental bakery manager in developing methods for production of new products. Minimum experience, 8 years. Excellent starting salary and outstanding company benefits. Plant located in SW Connecticut. Please send resume and salary history to Dept. 66, CEREAL SCIENCE TODAY, 1955 University Ave., St. Paul 4, Minn.

BOOK reviews

Advances in Food Research, vol. 10; edited by C. O. Chichester, E. M. Mrak, and G. F. Stewart. Academic Press, Inc., New York 3, N.Y., 1961. Price, $13.00. Reviewed by P. E. RAMSTAD, General Mills Inc., Minneapolis, Minn.

In the 12 years since the appearance of the first volume in this series, *Advances in Food Research* has established itself as the foremost review publication in its field, and the subject matter covered has gained in scientific stature. The progress that has been made is succinctly described by Prof. M. A. Joslyn at the beginning of the book. This is followed by seven comprehensive reviews, each written by one or more qualified authorities. The topics and their authors are:

Protein Chemistry and Food Research, by R. E. Feeney and R. M. Hill, Univ. of Nebraska; Aroma and Flavor of Japanese Soy Sauce, by Tamotsu Yokotsuka, Noda Inst. for Scientific Research, Japan; Public Health Significance of Paralytic Shellfish Poison, by E. F. McFarren, M. L. Schafer, J. E. Campbell, K. H. Lewis, E. T. Jensen, and E. J. Schantz, U. S. Public Health Service; Problems of the Potato Chip Industry — Processing and Technology, by the late H. D. Brown of Ohio State University; Sauerkraut, by C. S. Pederson, Cornell Univ.; The Postharvest Biochemistry of Tropical and Subtropical Fruits, by Jacob B. Biala, Univ. of California; Biochemistry and Meat Hydration, by Reimer Hamm, Kulmbach, Germany.

While the table of contents might seem to indicate little of interest to cereal scientists, most will find much of potential value in these reviews. Scientific principles cut across product lines in the food field as elsewhere. A description of a technological application in one industry may provide the essential spark to touch off a new development or approach in a seemingly foreign endeavor.

■ ■ ■ ■

Advances in Agronomy, vol. 12, edited by A. G. Norman; Academic Press, Inc., New York 3, N.Y., 1960. Price, $12.50.

Reviews: The Clay Fraction of Soils — Rich and Thomas; Technological Advances in Grass and Legume Seed Production and Testing — Garrison; Fertilizers in Forestry — Stoeckeler and Arneman; Agronomy in the Southwest U.S. — Fuller, McAlister, and Metcalfe; Mineral Nutrition of Soybeans — Ohlrogge; Physiology of the Soy bean — Howell; Water Infiltration into Soils — Parr and Bertrand; Red Clover — Fergus and Hollowell.

■ ■ ■ ■

Advances in Enzymology, vol. 22, edited by F. F. Nord; Interscience Publishers, Inc., New York 1, N.Y., 1960. Price, $14.00.

Reviews: Genetically Controlled Differences in Enzyme Activity — Fincham; Active Site and Enzyme Action — Koshland; Induced Synthesis of Proteins — Halvorson; Synthesis of Nucleotide Coenzymes — Baddiley and Hughes; Synthesis and Hydrolysis of Sulfate Esters — Roy; Biochemistry of Sulfonium Compounds — Shapiro and Schlenk; Biosynthesis of Cholesterol — Popjak and Cornforth; Coenzyme Binding — Shifrin and Kaplan; Saulenchromatographie von Enzyme — Turba. Cumulative indexes of volumes 1–12.

■ ■ ■ ■

The Science of Barley and Malt, ed. by A. H. Cook; Brewing Industry Research Foundation, Redhill, England; about 525 pp.; code No. 606.

"In this work, the first unified account of a swifty growing field, special emphasis is placed on recent botanical, chemical, biochemical, and technological advances. Findings are presented in a broad perspective, in recognition of the importance of the topics to other fields. The chemical nature of component substances and biochemical transformations in malting are discussed comprehensively by an international group of contributors." — Academic Press.

■ ■ ■ ■

Grain marketing in the Soviet Union with Emphasis on Wheat. Report of a technical study group, Economic Research Service, USDA. Order from Supt. of Documents, U.S. Govt. Printing Office, Washington 25, D.C. Price 40c.

The study group, who visited the USSR in 1960, consisited of V. J. Brensike, L. E. Holman, Lawrence Zeleny, J. C. Cowan, R. K. Durham, E. T. Olson, and R. E. Vickery.

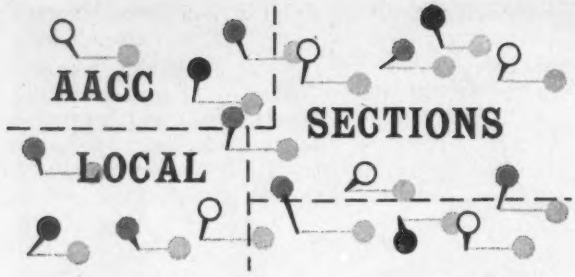
1960 Report, Grain Research Laboratory, by J. Ansel Anderson, Director, Board of Grain Commissioners for Canada, Winnipeg, Manitoba.

Seeds—1961 Yearbook of Agriculture; 591 pp., 48 pp. of photographs. U.S. Department of Agriculture. $2.00 from Supt. of Documents, Govt. Printing Office, Washington 25, D.C.

Surface-Active Materials in the Food Industry, by N. A. Petrov; Mar. 1961, 13 pp., 23 refs. RTS 1751. Trans. of Khimicheskaya Nauka i Promyshlenmost' (USSR) 1959, vol. 4, No. 5, pp. 617-622.

Wheat Cultivation in the USSR, by P. Zabaznyy (Kul'tura Pshenitsky v. SSSR); 1961; 20 pp. TL 1632; 61-13718.

Biochemical Indexes of the Bread-Baking Qualities of the New Sorts of Kazakhstan Wheat, by I. B. Darkanbayev and G. A. Kaptyushina; trans. by H. Curiskis; 1961; 24 pp., 20 refs. Trans. of Biokhim(iya) Zerna (USSR) 1960, v. 5, pp. 47-64.



Northwest Section I met on September 29 at Tempo Restaurant, Minneapolis. Robert J. Manning of Beckman Instruments, Inc., gave a brief survey of a few of the most widely used chemical laboratory instruments, particularly the combination of gas chromatography and infrared spectrophotometry. Their operation and uses in food processing were shown with slides. Trace analysis and micro analysis were emphasized, because of the current interest generated by the so-called "food additives amendment."

Speaker for the October 27 meeting was Alvin W. Donahoo, secretary, Minneapolis Grain Exchange, Public Relations.

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Pacific Northwest Section reports a successful meeting in Great Falls, Montana, on October 2, with "every major grain merchant and milling concern in Montana represented." Lawrence Zeleny demonstrated and explained the sedimentation test. Mark Barmore was on hand to explain how the test could be used to help evaluate wheat varieties. This was one of five such meetings to be held in the U.S.

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Northern and Southern California Sections' joint meeting on October 27 and 28 featured several Friday afternoon tours, making a choice necessary: The Roma Winery; the Pet Ritz plant (frozen pies); and Fresno Milling Co. Cocktail hour, banquet, entertainment, and dancing filled out the rest of the day. Technical sessions on Saturday presented: "The effect of Cookie Spread on Production and Quality" – F. R. Fuhr, Mothers Cake and Cookie Co.; "Studies with Protectants against Insects of Stored Grain" – R. G. Strong, Dept. of Entomology, Univ. of Calif., Riverside; "Alcohol, Carbonyl, and Organic Acids Contents of Pre-Ferments for Bread-Baking" – E. W. Cole, WURD, Albany, Calif.; "Recent Studies on Consumer Preference Regarding Sweetness Level" – Gordon Miller, C&H Sugar, San Francisco; "Food Supply for Fallout Shelters" – R. E. Ferrel, WURD, Albany; "Pesticides Residue Analysis of Cereal Products" – R. A. Moffitt, Carnation Research Labs., Van Nuys; "Market Testing of a New Wheat Food Product" – R. V. Enocian, Economic Research Service, USDA, Albany.

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New York Section met on October 17, to hear guest speaker Peter Pirrie, Engineering Editor of **Bakers Weekly,** report on key developments at the recent ABA-BEMA exhibition at Atlantic City. Some of these were: slicing and wrapping machines for handling polyethylene and polypropylene film, to wrap 60-plus units per minute; a machine which produces a bag and places the bread in it and then ties the bag at one end; improved slicers with better sharpening blades, giving steady, gentle forward motion to bread; new bulk handling devices, and automatic formulation through the use of punch cards. Continuous dough processes were highlighted at the show. Mr. Pirrie said that in one evening it was impossible to even mention all of the worthwhile developments shown at this exhibition, which takes place every 6 years. He stressed the rapid rate of technological development which has speeded obsolescence in the industry.

Speaker for the November 14 meeting was Truman L. Koehler, American Cyanamid Co., on the subject of "Applied Statistics in Quality Control" – a general review of the development and present status of statistical quality control methods and their economical application to process improvement and process development.

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Canadian Prairie Section met on October 17 for dinner at the Grain Exchange Cafeteria, and regular meeting in the Board Room of the building, a joint meeting with Canadian IFT. George Keightley, National Starch and Chemical Co., addressed the members on "Pregelatinized Food Starches," giving an outline of types of specialty food starches such as waxy maize, corn, and tapioca. The starches are modified by cross-linking, he said, and then are pregelatinized; these "instant" starches possess essentially the same characteristics as those in uncooked form; they are used in making pie fillings, soups, salad dressings, and the like.

Speaker for the November 21st meeting: Peter Meredith, National Research Council Postdoctorate Fellow at the Grain Research Laboratory, who recently spent two years in New Zealand.

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Cincinnati Section held its 18th annual joint meeting with Ohio Valley District and Gateway District No. 5, AOM, on November 3 and 4 at Woolford Hotel, Danville, Ill. A full and varied program of technical presentations included – Friday: "An Entomologist Looks at Your Mill" – Wm. Schoenherr, Lauhoff Grain Co.; "What's the Future of the U.S. Mill" – Herb Vanderlip, Allis-Chalmers; a movie, "Ship-Safe Grain Doors" – Bemis Bag Co.; "Quality Determination of High-Moisture Dried Wheat" – Glenn E. Hall, Ohio Agr. Exp. Sta., Wooster; "Just around the Corner – Bacteria Control in Flour Milling" – Jim Doty, Doty Laboratories, Kansas City, Mo. Saturday morning and afternoon sessions: "Practical Steps in Converting to Pneumatics" – Jack Kice, Kice Metal Products Co., Wichita Kansas; "Shortenings and Their Functions in Baking" – Jack Toll, Durkee Famous Foods, Louisville, Ky.; a brand-new movie, "Milling" – Ernest Auer, Miag Northamerica, Minneapolis; "What's Expected of Mills" – FDA, St. Louis office; "Automatic Palletizing and Can Loader" – R. G. Mott, R. T. Sheehan Co., Plymouth, Mich.; "Starch" – John Holborow, National Starch & Chem. Co., Chicago; "Dry-Stoning vs. Wet-Stoning" – Alan Croft, Simon-Carter Co., Minneapolis; "1961 Soft Wheat Crop Report" – Howard Simmons, Midwest Lab., Columbus, Ohio.

Midwest Section held a Wheat Symposium on November 6, beginning at 4 p.m. and continuing after social hour and dinner. Under chairman Welker G. Bechtel, participants in the discussion and their subjects were: "Agronomy and Marketing of Wheat" – Charles W. Pence, Kansas Wheat Improvement Association, Manhattan; "Modern Developments in Milling," – Austin T. Drake, Grain Processing Div., Sturtevant Co., Fostoria, Ohio; "Research on Industrial Uses of Wheat" – Carl E. Rist, NURDD, Peoria, Ill.; "New Food Uses and Nutritional Value of Wheat" – Stanley A. McHugh, American Bakeries Co., Chicago.

Next meeting will be the annual Christmas Party, on December 4. A talk on "Antonio Stradivari, the Artist and Chemist" will be given by David W. Young of Sinclair Research Laboratories.

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Chesapeake Section met October 26 at James House Restaurant, Baltimore, an old stand. The speaker, Carl Herald of American Viscose Corp., informed the group on the properties and applications of microcrystalline cellulose – trade name "Avicel," a noncaloric bulking agent. It can be added in varying amounts and viscosities to certain prepared foods to lower the calorie content, yet maintain the desired bulk. Hailed as the "newest development in calorie control," it has been used in cake batters, bread doughs, and salad dressings, and has other practical applications in the food industry. Dr. Herald has been with "Avicel" since its development, first as head of Product Development and presently as head of Technical Service.

the President's Corner

news of the association

MEETING OF THE TECHNICAL AND EXECUTIVE COMMITTEES, INTERNATIONAL ASSOCIATION FOR CEREAL CHEMISTRY

The Technical and Executive Committees of the International Association for Cereal Chemistry met June 5 and 6 at the German Federal Institute for Cereal Research, Detmold, Germany. Prof. P. Pelshenke and his staff served as hosts.

The Technical Committee meeting, K. Ritter presiding, consisted of reports from the chairman or chairman's representative covering the following study groups: sampling, moisture determination, ash determination, protein determination, determination of Besatz, documentation (definition of terms), physical dough testing, determination of wet gluten, diastatic activity, vitamins, special methods for durum wheat, baking test, fiber and starch determination, and liaison committee.

Full reports from these groups will be presented at the next general meeting in 1962, and approval of several procedures for official adoption will be sought. Approved methods will be published in several languages.

The Executive Committee met on June 6 with President R. Schneeweiss presiding and with F. Schweitzer, general secretary, and the following members present: K. Ritter, German Federal Republic, vice-president; E. Maes, Belgium; J. Buré, France; F. Silvela, Spain; J. Shellenberger, United States; and G. N. Irvine representing J. A. Anderson, Canada. P. Pelshenke, honorary president, was present also.

Neither Dr. Bertram, The Netherlands, nor Dr. Kosmina, U.S.S.R. was present. S. Hagberg, Sweden, died a few months ago. His passing had a saddening influence on the committee meeting and his absence was felt keenly.

President Schneeweiss welcomed the members of the Executive Committee and gave a brief address indicating the progress made by the IACC and expressing faith and hope in the future accomplishments of the organization.

F. Schweitzer reported that there are now 18 paid memberships in the Association, representing Australia, Austria, Belgium, Canada, France, German Democratic Republic, German Federal Republic, Greece, Italy, Luxembourg, The Netherlands, Spain, Sweden, Switzerland, Turkey, U.K., U.S.A., and U.S.S.R.

The financial situation was discussed at length. The expenses of the general meetings and the publication of reports and methods in several languages are extremely costly. There is need for additional funds if the tasks already undertaken are to be well done. It is hoped that additional funds will come from new memberships and that this will permit the reports to be presented promptly.

The next general meeting will be held in Vienna, June 6 to 9, 1962. Both the Technical and Executive Committees will meet during this period or possibly previous to the general meeting.

The following additional study groups were voted: rice, flour color, particle size, sedimentation, and microbiological research methods. It is expected that working members of these new groups will be named soon so that work can start and reports can be given by June of 1962.

J. A. SHELLENBERGER

NEW TECHNICAL COMMITTEES ORGANIZED

The chairman of the Technical Policy Committee announces the organization of two new technical committees.

The first is final organization of the committee on Yeast-Leavened Flavor, at the Dallas meeting. Chairman is Simon S. Jackel, Quality Bakers of America. A large group attended the organizational meeting in Dallas, signifying definite interest in the subject. From this group Dr. Jackel organized a committee of 20 other members (see October issue of CEREAL SCIENCE

TODAY for names). The three subcommittee chairmen have been named: Mr. Entner for selection of committee name; Dr. Ofelt for glossary and technology, and Dr. Wiseblatt for standardized test material.

The second new committee is a reorganization of the old Color Measurement Committee. This group will study flour color as measured by various reflectance instruments and investigate their relative merits and limitations. The prime purpose will be to reach some degree of uniformity for determining and reporting flour color. The chairman of this new committee is Grant Pearcy of The Pillsbury Co.; other members are Clinton L. Brooke of Merck & Co., R. E. Brown of International Milling, Fred Schmaltz of Russell Miller-King Midas, and William Shuey of General Mills, Inc. Although just recently organized, the committee is off to an enthusiastic start.

The Chairman also wishes to announce that Miss Mary Regulski of Chas. Pfizer & Co., Inc., has been appointed chairman of the committee on Vitamin and Mineral Analysis.

EDITH A. CHRISTENSEN, *Chairman*

NEWLY APPOINTED COMMITTEE ON CEREALS, FOOD AND NUTRITION BOARD, NAS–NRC

The Food and Nutrition Board of the National Academy of Sciences – National Research Council has recently established a Committee on Cereals with F. N. Peters of Chicago as its chairman. A prior committee on cereals was headed by R. R. Williams until his retirement from the Board and the Committee in October, 1959 (see item in CEREAL SCIENCE TODAY, March 1960 p. 80, by LeRoy Voris).

Members of the newly appointed committee are: F. N. Peters, Chairman, Quaker Oats Co.; J. B. Allison, Bureau of Biological Research, Rutgers Univ.; W. B. Bradley, American Institute of Baking; R. W. Engel, Dept. of Biochemistry & Nutrition, West Virginia Agr. Exp. Sta.; John A. Johnson, Kansas State Univ.; George O. Kohler, Field Crops Laboratory, WURDD; and E. J. Lease, Nutrition Dept., Agr. Exp. Sta., Clemson, S. C.

Like all committees of the NAS–NRC, the Committee on Cereals has a quasi-official advisory relationship to all departments of the federal government.

THE ZELENY SEDIMENTATION TEST – A CRITERION REGARDING THE 1962 WHEAT CROP FOR PRICE SUPPORT OPERATION

A need exists "to encourage production of more high-quality wheat, both for domestic and for export," announces the USDA. If one may be excused a bit of levity, let us hope that "more high-quality wheat" will replace, rather than add to, the country's expensive burdens of surplus wheat and its storage. Is it too much to hope that, for a suitable time, production of a *single* hundredweight of better-protein wheat may succeed at least two hundredweight of inferior-protein wheat?

During 1961, the decision has been announced that:

"Starting with the 1962 wheat crop, premiums for quality of Hard Red Winter and Hard Red Spring wheats will be included as part of the price support operation.

"The premiums, which will reflect the baking quality of wheat better than the current protein premiums do, are being included because of the need to encourage production of more high-quality wheat, both for domestic use and for export.

"The purpose of this fact sheet is to bring to those directly concerned with carrying out the operation, as well as those who will be directly affected by the change, sufficient background information to make the new premiums clearly and fully understood."

The above paragraphs are from the mimeographed explanation, "The Quality Baking Test for Wheat and the 1962 Wheat Price Support Program," marked PA-473, September 1961. Presumably copies are available on request to USDA, Washington 25, D.C., so long as the supply lasts.

It seems redundant to tell regular readers of CEREAL SCIENCE TODAY that other related items, such as "Selected Abstracts of Papers on the Sedimentation Test," have been compiled by USDA and are available on request.

This writer is grateful to Dr. Zeleny for making a set of reports available for these comments.

FRANK L. GUNDERSON

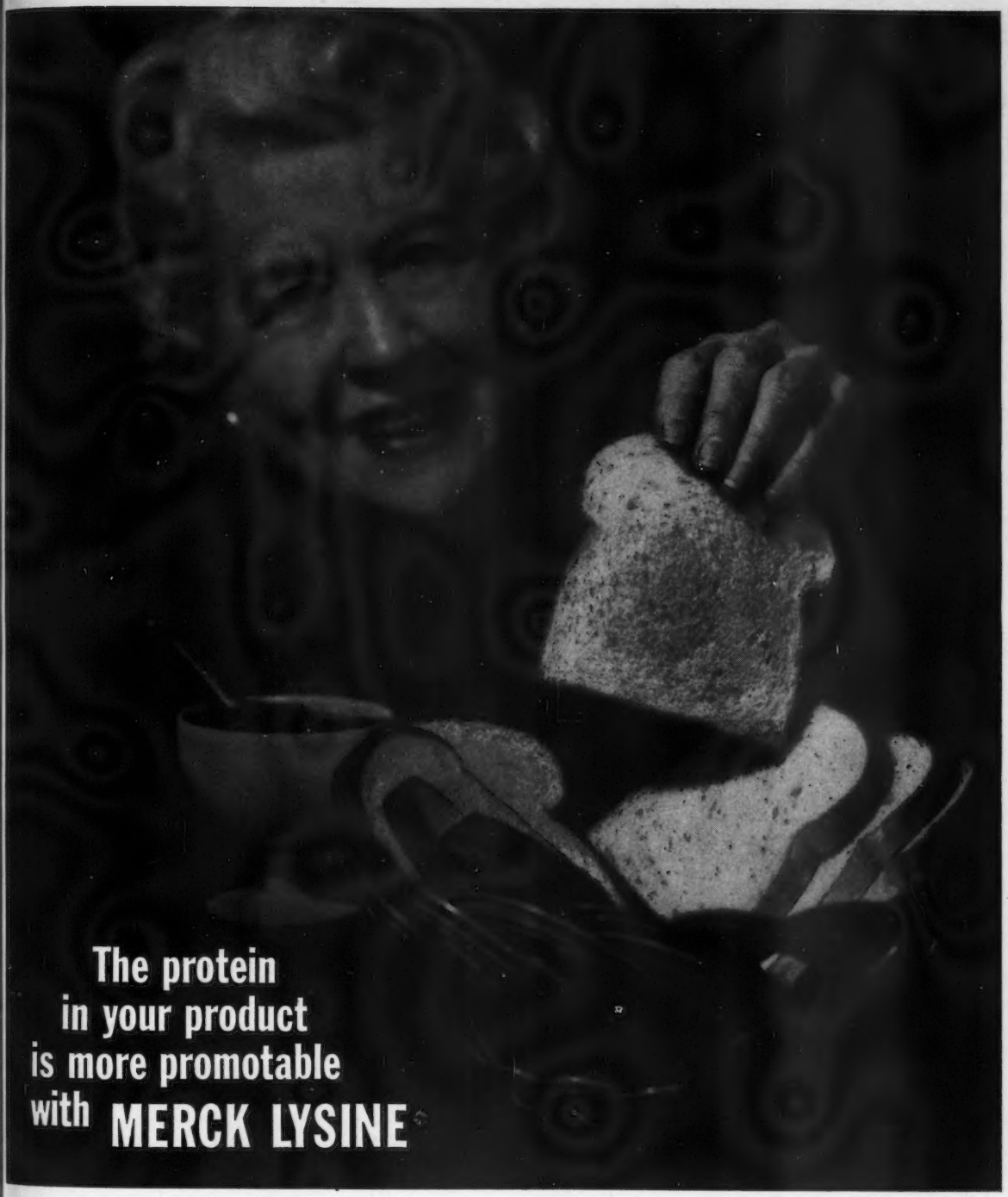
EDITOR'S NOTE: *Procedures for running the sedimentation test, and selected abstracts from published papers on the subject, are available in mimeographed form from the U.S. Department of Agriculture.*

STOPPER FOR NEW KJELDAHL FLASK

The new Corning 800-ml. Kjeldahl long-necked Pyrex flask (No. 5420) has a full taper at the top of the neck rather than a partial taper that has been standard for many years. In the Grain Research Laboratory, where some 70,000 protein tests are made annually, we have found that rubber stoppers that were satisfactory for the old-type flask are not satisfactory for the new flask. The poor fit of the stopper sometimes causes separation from the flask on the distillation unit, and, aside from losing the test, there is great danger of the flask falling and spilling boiling caustic on near-by technicians. The Laboratory has made a large number of inquiries and tried different stoppers for use with the new flask, and the one that has been adopted is the No. 25 amber pure gum rubber stopper, CAL grade (10-mm. hole for a 12-mm. trap stem), obtainable from Rhoades Rubber Corp., P. O. Box 110, Easthampton, Mass. This stopper with the new flask works very satisfactorily and overcomes the difficulties mentioned above.

T. R. AITKEN

Grain Research Laboratory
Winnipeg 2



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• • • The Netherlands

FUNDAMENTAL ASPECTS OF DOUGH RHEOLOGY

A private conference with this title was held at the Institute for Cereals, Flour and Bread T.N.O., Wageningen, The Netherlands, September 19-21, 1961. Participants were I. Hlynka, Winnipeg, Canada; G. A. H. Elton and D. W. E. Axford, Chorleywood, U. K.; A. Rotsch, Detmold, Federal German Republic; H. L. Bungenberg de Jong, De Bilt, and A. H. Bloksma, Wageningen, The Netherlands. Seven papers were read. Between these ample time was available for discussions. This procedure proved to be very satisfactory.

Two reviews were given at the start of the conference. In a paper entitled "Wheat Proteins and Flour Strength" Elton analyzed processes during fermentation baking. It was concluded that the quality of bread is largely dependent upon the ability of dough to be stretched by the increasing pressure of carbon dioxide and water vapor in the gas cells without losses of gas by diffusion or rupture of dough membranes. Under the title "The Chemical Structure of Dough," Bloksma reviewed the present knowledge of the relation between chemistry and rheology of dough. Anticipating later discussions, attention was focused on the chemistry of thiol groups and the role of flour lipids in dough.

Two papers on rheology in a more strictly physical sense followed. Experiments with the Brabender Farinograph were reported by Hlynka in "Rheological Background of the Farinograph." The effects of temperature, rate of mixing, and salt additions on resistance against mixing were studied. Another approach was followed by Bloksma in "Slow Creep of Wheat Flour Doughs." He designed an apparatus in which geometrically well-defined test-pieces were homogeneously sheared by constant stresses. Rates of deformation were chosen in the same order of magnitude as during fermentation in a bakery.

The same two speakers initiated a discussion on the role of flour lipids. The paper "Rheological Studies of the Role of Lipids in Dough" by I. Hlynka and N. K. Narayanan dealt with the role of flour lipids in relation to oxidation and reduction processes in dough. This is connected with atmospheric oxygen occluded during mixing, added oxidizing flour improvers, and thiol groups of the wheat proteins. In "Mixing Properties of Defatted Wheat Flours" Bloksma concluded that particular extractions of lipids from flour result in retarded dough development, which is not affected by atmospheric oxygen. After longer mixing times differences in the sensitivities to oxygen of doughs from various extracted flours are shown.

Axford read a paper, "Disulfide Groups in Flour Proteins." The effect of disulfide cross-links on rheological properties and mechanical rupture of these cross-links by mixing were discussed.

Most papers will be published, at the discretion of the speakers.

G. JONGH

EDITOR'S NOTE: *Dr. Jongh has very kindly prepared the above report for our regular correspondent, G. L. Bertram, who is seriously ill.*

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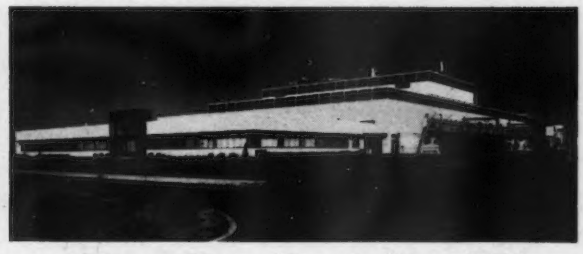

Midwestern Plant — Champaign-Urbana, Illinois

Observations

The more work we do with our laboratory model continuous dough mixer, the more we become convinced that such methods of bread production are capable of producing excellent bread from a wide range of flours. Certainly the stronger flours produce better bread with less equipment adjustment. However, with rather drastic adjustment of mixer head speed, we can produce very good bread with low-protein flour. Of course, in the laboratory we can make drastic changes that commercial continuous mix bread bakers would not make.

Perhaps instead of demanding stronger, more uniform flours, the baker should be experimenting to see how weak a flour could be used and still produce good bread. Certainly the type of flour required will vary with each plant. Furthermore, if the baker is stepping up his production to the point that there is no flexibility left, he is defeated before he starts. If a machine is designed to have flexibility on the basis of two tons of dough per hour and the baker operates at three tons per hour, there can be no flexibility left.

There is no assurance that what we do in the laboratory can be duplicated in the commercial plant unless such experimental work can be done. To make some of the radical changes on a commercial unit which are made on the laboratory unit may produce unsaleable bread; yet such changes make very good bread in the laboratory. But, until such experimental work is done, we cannot be sure of proper flour specifications. All new equipment requires full exploration before ingredient specifications can be set. Perhaps we are impatient, and time will answer our questions.

Doty Laboratories will open in 924 Flour Exchange Building, Minneapolis, Minnesota, by January 1, 1962, and of course we need your support. Flour mill, feed mill, and bakery contracts are solicited.

Jim Doty

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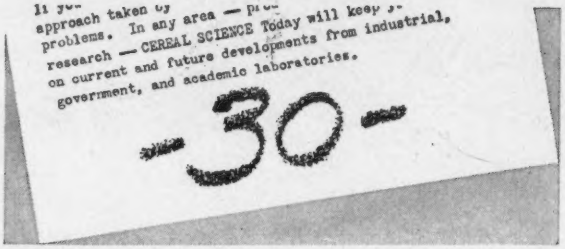
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TODAY'S RESEARCH

Monsanto Chemical Company's Board Chairman Charles Allen Thomas has spoken of the "synergistic atmosphere for the spawning of new achievements" as one benefit of bringing scientists of varying disciplines together in one location.

Synergism — the co-operative action that results in a greater total effect than could have been achieved by the individual parts working independently — is given a clear field by the scheme of operation of Monsanto's new Research Center, which was dedicated with appropriate ceremonies on October 27.

Built to meet the ever-changing demands of modern chemical research, the Center is located in suburban Creve Coeur, Mo., adjacent to the company's general offices. It includes six new buildings covering almost 11 acres, and two laboratory buildings completed previously for the Inorganic Chemicals and Agricultural Chemicals Divisions.

The Center is the focal point for about a third of Monsanto's total research. It will supplement — not replace — the other laboratories.

The new buildings contain 75 modular laboratory units, 10 larger laboratories, and other facilities including a library and meeting room seating 360 persons.

Modular laboratory units were specially developed to afford easy adaptability to shifting space requirements within the buildings. Flexibility was the aim also in arrangements of building masses to provide for future expansion.

The main part of the Center complex contains four interconnected, four-story buildings; two are laboratories and two are general services areas. There is also a special-purpose laboratory building and a utility building.

In developing the laboratory module, Monsanto considered the widely diversified group of research personnel for which the Center was planned. A prototype module was tested in actual day-to-day operation for more than a year before the design was "frozen." It provides researchers with ample space for work benches, fume hoods, and cabinets.

The basic module, 22 ft. wide and 30 ft. long, can accommodate four men, each with 23 feet of bench plus a writing area.

All module walls are movable. All piping is brought in overhead and dropped to bench level, permitting permanent installation of pipes even though walls and benches can be moved.

The middle section of the module can contain four 6-ft. fume hoods and two 8-ft. distillation racks. Alternatively, the area can be left completely open, or hoods of the walk-in type can be installed.

The fume hood is a new type developed by Monsanto, requiring a lower air exchange than standard hoods, for safe operation. The hood has three sliding glass doors and a continuous air slot around its periphery.

By the end of 1961, about 370 scientific and supporting personnel will be employed in the new buildings; 200 are already in the Agricultural and Inorganic laboratories. Total personnel in the new structures is expected to rise to 800 when all buildings are completed.

The "new achievements" to come from the Center should be of a kind and number to command attention in the scientific world.

R.J.T.

Season's Greetings

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V. P.

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Tech. Dir.

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Mgr. Milling & Baking Div.

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To all our friends, our sincere wishes for a very Merry Christmas and a Happy and Prosperous New Year.

R. L. Whiteside
President

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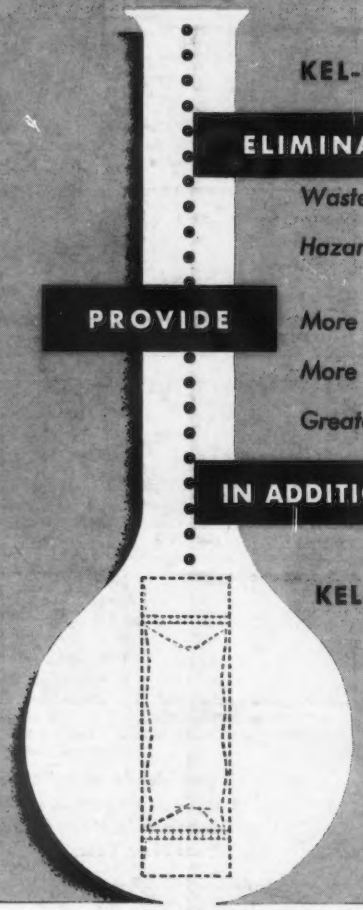
FOR YOUR CONVENIENCE

Harshaw KEL-PAK Digestion Catalyst Powders

Harshaw KEL-PAK Powders are carefully compounded mixtures of Potassium Sulphate; Mercuric Oxide and/or Copper Sulphate in sealed polyethylene packets containing sufficient catalyst for one protein determination.

To use, simply drop one packet into flask



KEL-PAK POWDERS

ELIMINATE

Messy mixing operations

Waste due to spillage and spoilage

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More uniform mixtures

More accurate additions

Greater speed in adding catalyst to flask

IN ADDITION..

Polyethylene packet reduces foaming

KEL-PAK POWDERS are available in 5 formulas

#1 9.9 grams K_2SO_4; .41 gram H_gO; .08 $CuSO_4$

#2 10 grams K_2SO_4; .3 gram $CuSO_4$*

#3 9 grams K_2SO_4; .35 gram H_gO*

#4 10 grams K_2SO_4; .7 gram H_gO*

#5 15 grams K_2SO_4; .7 gram H_gO*

* Meet A.O.A.C. specifications

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